CLAIMS

What is claimed is:

1. A catalyst system comprising:

(a) a catalyst comprising chromium; and

(b) a cocatalyst comprising a non-transition metal cyclopentadienyl (Cp) compound.

2. The catalyst system of claim 1, wherein the non-transition metal Cp compound comprises a Group I metal Cp compound, a Group II metal Cp compound, a Group III metal Cp compound, or combinations thereof.

3. The catalyst system of claim 1, wherein the non-transition metal Cp compound comprises a non-transition metal Cp compound, a non-transition metal fluorenyl compound, a non-transition metal indenyl compound, or combinations thereof.

4. The catalyst system of claim 1, wherein the non-transition metal Cp compound comprises cyclopentadienyl lithium, dicyclopentadienyl magnesium, a lithium aluminum cyclopentadienyl trialkyl, or combinations thereof.

5. The catalyst system of claim 1, wherein the catalyst comprises a support comprising silica, alumina, aluminophosphate, titania, zirconia, alumina, boria, thoria, magnesia, or combinations thereof.

6. The catalyst system of claim 5, wherein the catalyst is activated in an oxygen-containing ambient at a temperature in a range of from about 400°C to about 900°C and then reduced in carbon monoxide at a temperature in a range of from about 200°C to about 800°C.

7. The catalyst system of claim 1, wherein a mole ratio of the non-transition metal Cp compound to the chromium is in a range of from about 0.001 to about 10.

8. The catalyst system of claim 1, wherein the non-transition metal Cp compound comprises one or more substituents.

9. The catalyst system of claim 8, wherein the one or more substituents comprise an alkyl group, an aryl group, an alkylaryl group, an alkoxy group, an aryloxy group, an alkylsilyl group, or combinations thereof.

10. A method of preparing a catalyst comprising contacting a support with chromium and with a non-transition metal cyclopentadienyl (Cp) compound.

11. The method of claim 10, wherein said contacting the support with the non-transition metal Cp compound comprises impregnating the support with a solution comprising the non-transition metal Cp compound.

12. The method of claim 10, wherein said contacting the support with the non-transition metal Cp compound comprises separately introducing to a reactor the non-transition metal Cp compound and the support comprising the chromium.

13. The method of claim 10, wherein the non-transition metal Cp compound and the support comprising the chromium are contacted continuously for a period of from about 1 minute to about 2 hours before entering a reactor.

14. The method of claim 10, wherein the non-transition metal Cp compound comprises a Group I metal Cp compound, a Group II metal Cp compound, a Group III metal Cp compound, or combinations thereof.

15. The method of claim 10, wherein the non-transition metal Cp compound comprises a non-transition metal Cp compound, a non-transition metal fluorenyl compound, a non-transition metal indenyl compound, or combinations thereof.

16. The method of claim 10, wherein the non-transition metal Cp compound comprises cyclopentadienyl lithium, biscyclopentadienyl magnesium, a lithium aluminum cyclopentadienyl trialkyl, or combinations thereof.

17. The method of claim 10, wherein the non-transition metal Cp compound comprises one or more substituents.

18. The method of claim 17, wherein the one or more substituents comprise an alkyl group, an aryl group, an alkylaryl group, an alkoxy group, an aryloxy group, an alkylsilyl group, or combinations thereof.

19. The method of claim 10, wherein the support comprises silica, alumina, aluminophosphate, titania, zirconia, alumina, boria, thoria, magnesia, or combinations thereof.

20. The method of claim 10, further comprising activating the catalyst via calcination at a temperature in a range of from about 400°C to about 1,000°C.

21. The method of claim 10, further comprising reducing the catalyst at a temperature in a range of from about 200°C to about 800°C.

22. The method of claim 21, wherein the catalyst is reduced in the presence of carbon monoxide.

23. The method of claim 10, wherein a mole ratio of the non-transition metal Cp compound to the chromium in the catalyst is in a range of from about 0.003 to about 20.